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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,776	06/30/2003	Kei Yamamoto	204552028900	8129

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EXAMINER

FORDE, DELMA ROSA

ART UNIT	PAPER NUMBER
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2828

MAIL DATE	DELIVERY MODE
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09/15/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/608,776	Applicant(s) YAMAMOTO ET AL.	
	Examiner DELMA R. FORDE	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 8-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-22 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 5, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrea Oster, et al. "Gain spectra measurement of strained and strain-compensated InGaAsP-AlGaAs Laser structure for $\lambda \approx 800$ nm" in view of Fukunaga et al (6,127,691).

TABLE 1
LAYER SEQUENCE OF LASER STRUCTURES UNDER INVESTIGATION

layer	composition	thickness (nm)
contact	p-GaAs	
cladding	p-Al _{0.3} Ga _{0.7} As	1800
waveguide	p-Al _{0.65} Ga _{0.35} As	500
	Al _{0.65} Ga _{0.35} As → Al _{0.3} Ga _{0.7} As	10
active region	A In _{0.15} Ga _{0.85} As _{0.75} P _{0.25}	18
	B In _{0.25} Ga _{0.75} As _{0.5} P _{0.5}	13
	C In _{0.25} Ga _{0.75} As _{0.75} P _{0.25}	5
	GaAs _{0.75} P _{0.25}	5
	D In _{0.25} Ga _{0.75} As _{0.75} P _{0.25}	5
waveguide	GaAs _{0.75} P _{0.25}	5
	Al _{0.35} Ga _{0.65} As → Al _{0.65} Ga _{0.35} As	500
cladding	n-Al _{0.3} Ga _{0.7} As	2000
buffer	n-GaAs	
substrate	n-GaAs	

TABLE II
CHARACTERISTIC DATA FROM PULSED BA LASER MEASUREMENT
(PULSE LENGTH: 500 ns, DUTY CYCLE: 1:400)

Sample	A	B	C	D
η_{sp} (%)	0.1	0.6	1.0	1.0
η_R (%)	-	-	-	-1.0
λ (nm)	796	808	791	797
η_i (%)	75	79	77	92
α_i (cm ⁻¹)	≈ 1	≈ 1	≈ 1	≈ 1
j_p (A cm ⁻²)	200	128	150	137
ΓG_b	18.5	14	19	18

Regarding claims 1, 5 and 8 Oster (Examiners includes Tables I and II) discloses semiconductor laser device having an oscillation wavelength of larger than 760nm and smaller than 800nm (see abstract and page 635 Table II and first paragraph of “BA Lasers”) in which at least a lower clad layer (see Table I on page 632) a lower guide layer (see Table I on page 632, the reference call “waveguide”), an active region (see Table I on page 632) and upper guide layer (see Table I on page 632) and an upper clad layer (see Table I on page 632) are supported by GaAs substrate (see Table I on page 632), the active region having a quantum well (see Table I on page 632) structure in which one or more well layers and barrier layers (see Table I on page 632) are stacked, wherein one or more well layers are formed of InGaAsP (see Table I on page 632) and said upper and/or lower guide layer is formed of $Al_zGa_{1-z}As$ ($0.20 < z < 1$) (see Table I on page 632), said one or more well layers are compressive strained and said barrier layers are tensile strained (page 631, abstract, I. Introduction section first paragraph and II. Experimental section, first paragraph), each of the $Al_zGa_{1-z}As$ upper and/or lower guide layers (see Table I on page 632, the reference call “waveguide”) interfaces with an adjacent tensile strained barrier layer (see Table I on page 632), and

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upper and lower surfaces of each of the one or more well layers interfaces with an adjacent tensile strained barrier layer (see Table I on page 632).

Oster discloses the claimed invention except for barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer. Fukunaga teaches barrier layers are formed of InGaAnP. However, it is well known in the art to apply the barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer as disclosed by Fukunaga in abstract, Column 3, Lines 35 – 45, Column 5, Lines 60 – 67 and Column 6, Lines 1 – 12. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known the barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer as suggested by Fukunaga to the laser of Oster, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claims 2 and 5, Oster discloses a value of z representing a mole fraction of Al in the group III element of said upper and/or lower guide layer is larger than 0.25 (see Table I on page 632), a value of z , where a value of z represents a mole fraction of Al in the group-III elements of said upper and/or lower guide layer, of at least a portion in contact with a barrier layer of said upper and/or lower guide layer is smaller than 0.4. (See Table I on page 632).

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Regarding claims 3, and 4, Oster discloses a upper and lower cladding (see Table I on page 632) contain Al, and a value of z, wherein a value of z represent a mole fraction of Al in the group-III elements of said upper and/or lower guide layer, is smaller than a value of an Al mole fraction of said upper and lower clad layer and the value of z varies stepwise or continuously and is such a fashion as to increase with increasing nearness to said upper and lower clad layers (see Table I on page 632).

Allowable Subject Matter

Claims 9 – 22 are allowed.

The following is an examiner's statement of reasons for allowance: Claim 9 recites a semiconductor laser structure including the specific structure limitation of barrier layer are formed of an $\text{In}_{1-x}\text{Ga}_x\text{As}_{1-y}\text{P}_y$ having a band gap energy larger than that of said well layers, and there hold relationship that $0 < x < 1$; $0.02 < y < 0.75$ and $|(a_2 - a_1) / a_1| * 100 \geq 0.65$, where a_1 is lattice constant of said one or more well layers, and a_2 is lattice constant of said barrier layers, which is neither anticipated or disclosed nor suggested in any piece of available prior art, which is neither anticipated nor obvious over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 09/04/2009 have been fully considered but they are not persuasive. Applicant argues the prior art lack on pages 6 and 7 said;

"The combination of Oster and Fukunaga fails to disclose or suggest the claimed arrangement of InGaAsP barrier layers with InGaAsP well layer(s) and AlGaAs guide layer(s). The asserted combination would not disclose or suggest the claimed arrangement of the compressive strained InGaAsP well layer(s) and tensile strained InGaAsP barrier layers, as recited in claim 1".

The examiner disagrees with the applicant's argument, since the prior art does teach or suggest as claimed. Fukunaga teaches barrier layers are formed of InGaAsP and the barrier layers having band gap energy larger than that of said one or more well layer. It is well known in the art to apply the barrier layers are formed of InGaAsP and the barrier layers having band gap energy larger than that of said one or more well layer as disclosed by Fukunaga in abstract, Column 3, Lines 35 – 45, Column 5, Lines 60 – 67 and Column 6, Lines 1 – 12. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known the barrier layers are formed of InGaAsP and the barrier layers having band gap energy larger than that of said one or more well layer as suggested by Fukunaga to the laser of

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Oster, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice as stated in the rejection above.

However, as limited before in claim 1 (barrier layers are formed of any-one InGaAsP and GaAsP, filed on 06/30/2003) and the specification (since the barrier layer is formed of GaAsP or InGaAsP and the P-element mole fraction is larger than 0.2 and smaller than 0.75, the E_v difference, $|\Delta E_v|$, from the GaAs substrate can be set smaller, compared with the InGaP barrier layer. Therefore, the efficiency of hole injection from the guide layer to the well layer is improved to a large extent and using GaAsP or InGaAsP having a mole fraction close to that of GaAsP are improved remarkably. With those materials, it has been conventionally considered to be incapable of obtaining effectiveness because of small E_g (specification Paragraph [0033 - 35])) barrier layer formed of GaAsP. Therefore, it is certain to assume that GaAsP and InGaAsP are a recognized species equivalent to the ones claimed in amended claim 1.

Oster discloses one or more well layers are compressive strained and said barrier layers are tensile strained (page 631, abstract, I. Introduction section first paragraph and II. Experimental section, first paragraph) and Fukunaga disclose these limitations too on Column 1, Lines 64 – 67, Column 2, Lines 1 – 22 and Column 3, lines 20 – 49.

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically

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pointing out how the language of the claims patentably distinguishes them from the references.

Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DELMA R. FORDE whose telephone number is (571)272-1940. The examiner can normally be reached on M-T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DELMA R. FORDE/
Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828